**Test Specification Weights for the Math II NC Final Exam**

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| **Domain** | **Percent of Total**  **Score Points** |
| **The Real Number System (RN)** | **2% to 5%** |
| **Seeing Structure in Expressions (SSE)** | **26% to 34%** |
| **Arithmetic with Polynomials & Rational Expressions (APR)** |
| **Creating Equations (CED)** |
| **Reasoning with Equations & Inequalities (REI)** |
| **Interpreting Functions (IF)** | **25% to 31%** |
| **Building Functions (BF)** |
| **Congruence (CO)** | **25% to 31%** |
| **Similarity, Right Triangles, & Trigonometry (SRT)** |
| **Expressing Geometric Properties with Equations (GPE) \*\*\*\*\*** |
| **Geometric Measurement and Dimension (GMD) \*\*\*\*\*** |
| **Modeling with Geometry (MG) \*\*\*\*\*** |
| **Making Inferences & Justifying Conclusions (IC)** | **7% to 10%** |
| **Conditional Probability and the Rules of Probability (CP)** |
| **Total** | **100%** |

**Due to the revisions of the Math II curriculum some adjustments will be made at a later date.**

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|  | **Unit 1: Congruence, Proofs and Constructions**  ***Domain (s): Congruence NC.M2.G-CO***  **Experiment with transformations in the plane.**  **Standards:**  NC.M2.G.CO.2 Experiment with transformations in the plane.   * Represent transformations in the plane * Compare rigid motions that preserve distance and angle measure (translations, reflections, rotations) to transformations that so not preserve both distance and angle measure (e.g. stretches, dilations). * Understand that rigid motions produce congruent figures while dilations produce similar figures.   NC.M2.G.CO.3 Given a triangle, quadrilateral, or regular polygon, describe any reflection or rotation symmetry i.e., actions that carry the figure onto itself. Identify center and angle(s) of rotation symmetry. Identify line(s) of reflection symmetry.  NC.M2.G.CO.4 Verify experimentally properties of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.  NC.M2.G.CO.5 Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image.  **Standards**  **Understand congruence in terms of rigid motions**  NC.M2.G.CO.6 Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that will transform one figure onto the other.  NC.M2.G.CO.7 Use the properties of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.  NC.M2.G.CO.8 Use congruence in terms of rigid motion. Justify the ASA, SAS, and SSS criteria for triangle congruence. Use criteria for triangle congruence (ASA, SAS, SSS, HL) to determine whether two triangles are congruent.  **Standards**  **Prove geometric theorems**  NC.M2.G.CO.9 Prove theorems about lines and angles and use them to prove relationships in geometric figures including:   * Vertical angles are congruent. * When a transversal crosses parallel lines, alternate interior angles are congruent. * When a transversal crosses parallel lines, corresponding angles are congruent. * Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment * Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle.   NC.M2.G.CO.10 Prove theorems about triangles and use them to prove relationships in geometric figures including:   * The sum of the measures of the interior angles of a triangle is 180º. * An exterior angle of a triangle is equal to the sum of its remote interior angles. * The base angles of an isosceles triangle are congruent. * The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length | |
| **Mathematics Practices:**  1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics.  5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Essential Question(s):**   1. What are points, lines and planes, collinear & coplanar points and intersecting lines and is there a real life representation of them? 2. How do you apply the basic properties of transformations? 3. When 2 parallel lines are cut by a transversal what special angles are formed how can I use special angle relationships to solve problems involving angle measure? 4. What happen when you reflect or rotate a point in a coordinate plane? 5. What are congruence transformations and how are they useful? 6. What are perpendicular bisectors, angle bisectors, medians and altitudes and how are they used to find missing measures and solve problems? | |
| **Content Vocabulary:**  Points, lines, planes, segments, parallel, perpendicular, angles, bisector, sub-set of lines, vertical lines and angles, equidistant, congruence, adjacent angles, linear pair, interior and exterior angles, midpoint and distance, collinear/ non collinear, coplanar/non coplanar, intersecting, skew lines, rotations, reflections, transformations, translations, rigid motion, circular arc, ASA, SAS, SSS, regular polygon, transversal lines, corresponding angles, alternate interior and exterior angles, perpendicular and angle bisectors, median, angle sum theorem, quadrilateral and its properties, isosceles, concurrent lines and parallelogram and its properties. | **Academic Vocabulary:**  **Justify**  **Explain**  **Construct**  **Represent**  **Argument**  **Create**  **Interpret**  **Build**  **Prove**  **Experiment** |
| **Concepts: ( I can……)**  **What Students Need to Know**:   1. I can define , identify and construct the basic geometric terms such as line, planes and angles and how can be used to prove theorems. 2. I can manipulate a given figure to represent the different transformations (rotation, reflection, translation). 3. I can draw and compare transformations that preserve distance an angle to those that do not. 4. I can identify rotation and reflection images of figures. 5. I can determine if two given geometric figures are congruent in terms of rigid motion and if the conditions of congruency have been met. 6. I can describeASA, SAS, and SSS satisfy the congruency conditions for triangles. 7. I can prove geometric theorems about lines, angles, parallelograms and triangles. | **Skills:**  **What Students Need To Be Able To Do:**   1. Define, identify and construct the basic geometric terms such as lines, planes and angles to prove theorems. 2. Manipulate a given figure to represent the different   transformations ( rotation, reflection, translation)   1. Draw and compare transformations that preserve distance and angle to those that do not. 2. Identify rotation and reflection images of figures. 3. Determine if two given geometric figures are congruent in terms of rigid motion and if the conditions of congruency have been met. 4. DescribeASA, SAS, and SSS satisfy the congruency conditions for triangles. 5. I can prove geometric theorems about lines, angles, parallelograms and triangles. |
| **Recommended Assessments:**  Daily Formative Assessments  Collaborative Assessments  Student Products  Common Formative Assessments (every 3 to 4 weeks)  Weekly Teacher made test  Quick writes  Find the error  Foldables  Discovery- Why is there 180◦ in a triangle?  Group work  Projects  Graphic organizers/ Constructions Steps  Venn Diagrams/ Two- column proof  Anticipation/prediction guides  Daily “DO NOW”, “EXIT TICKET” (Constructive Response Journals Books) | |
| **Recommended Resources:**  **DPI website:** [**www.ncpublicschools.org**](http://www.ncpublicschools.org)  Algebra Resources  NCDPI Indicators  Instructional Resources  Common Core Unpacking the standards  Live Binder [www.livebinder.com](http://www.livebinder.com)  Google docs  Dropbox [www.dropbox.com](http://www.dropbox.com)  **Begin to include applications for each topic and open-ended questions**  [**http://www.doe.virginia.gov/instruction/mathematics/high/index.shtml**](http://www.doe.virginia.gov/instruction/mathematics/high/index.shtml)  [**http://www.smarterbalanced.org/smarter-balanced-assessments**](http://www.smarterbalanced.org/smarter-balanced-assessments) from given data?  <http://mdk12.org/share/frameworks/CCSC_AlgebraII.pdf>  <https://sites.google.com/a/audubonschools.org/mathematics/algebra-ii>  <http://www.state.nj.us/education/modelcurriculum/math/AlgebraIIu4.pdf>  <http://www.livebinders.com/play/play/430659?backurl=%2Fshelf%2Ffeatured&play_view=play>  <https://njctl.org/courses/> | |

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|  | **Unit 2:**  **Similarity, Proof, and Trigonometry**  **Domain:** Similarity, Proof, and Trigono**metry- NC.M2.G-SRT**  **Standards:**  **Understand similarity in terms of similarity transformations**  NC.M2.G-SRT.1 Verify experimentally the properties of dilations with given center and scale factor:  a. When a line segment passes through the center of dilation, the line segment and its image lie on the same line. When a line segment does not pass through the center of dilation, the line segment and its image are parallel.  b. The length of the image of a line segment is equal to the length of the line segment multiplied by the scale factor.  c. The distance between the center of a dilation and any point on the image is equal to the scale factor multiplied by the distance between the dilation center and the corresponding point on the pre-image.  d. Dilations preserve angle measure.  NC.M2.G-SRT.2 Understand similarity in terms of transformations.  a. Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other.  b. Use the properties of dilations to show that two triangles are similar when all corresponding pairs of sides are proportional and all corresponding pairs of angles are congruent.  NC.M2.G-SRT.3 Use transformations (rigid motions and dilations) to justify the AA criterion for triangle similarity.  **Standards:**  **Prove theorems involving similarity.**  NC.M2.G-SRT.4 Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures.   * A line parallel to one side of a triangle divides the other two sides proportionally and its converse. * The Pythagorean Theorem   **Standards:**  **Define trigonometric ratios and solve problems involving right triangles**  NC.M2.G-SRT.6 Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the triangle, due to the preservation of angle measure in similarity. Use this discovery to develop definitions of the trigonometric ratios for acute angles.  NC.M2.G-SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context.  **Standards:**  **Apply trigonometry to general triangles.**  NC.M2.G-SRT.12 Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems. | | |
| **Mathematical Practices**  1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics.  5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | **Essential Questions**   1. What is similarity and how is it applied to scale drawings? 2. What is the Pythagorean Theorem and when is it properly applied? 3. What makes quantities proportional? 4. What are the properties of similar polygons and how can they be used to find missing measurements? 5. How are proportions used to verify similarity between objects? 6. What are the basic trigonometric ratios? 7. What are the inverse trigonometric functions? How are they used to find angles? | |
| **Content Vocabulary**  Congruent figures, Similar figures, Scale, Proportion, Similarity Ratio, Proportion, Means, Extremes, Cross-Products, Reciprocal, dilation, transformation, Pythagorean theorem, angle of elevation, angle of depression, opposite, adjacent, hypotenuse, altitude, proportionality theorem, inverse functions, converse, AA similarity, area, volume, acute angle, right angle, obtuse angle, special right triangles | **Academic Vocabulary:**  Compare, Estimate ,Technology ,Calculate ,Compose  Determine, Relate, Context, Observe, Construct , Recognize | |
| **Concepts: (I can……)**  **What Students Need to Know**:   1. I can identify the center of dilation, draw the image, classify if it as a reduction or enlargement, compare and contrast the properties of pre-image and image of the figures. 2. I can determine if two polygons are similar, write the similarity statement and justify if not. 3. I can use congruence and similarity criteria to solve for missing information in Triangles using proportions to identify missing information in similar triangle. 4. I can solve problems involve similar triangles using the special right triangles and Pythagorean Theorem. 5. I can find the unknown measurements of right and non-right triangles. | | **Skills:**  **What Students Need To Be Able To Do:**   1. Identify the center of dilation, draw the image, classify if it as a reduction or enlargement, compare and contrast the properties of pre-image and image of the figures. 2. Determine if two polygons are similar, write the similarity statement and justify if not. 3. Use congruence and similarity criteria to solve for missing information in Triangles using proportions to identify missing information in similar triangle. 4. Solve problems involve similar triangles using the special right triangles and Pythagorean Theorem. 5. Identify, write and apply Trigonometric ratios to solve problems involving right triangles. |
|  | **Recommended Assessments:**  Daily Formative Assessments  Student Products  Common Formative Assessments (every 3 to 4 weeks)  Weekly Teacher made test  Quick writes  Find the error  Foldables  Group work  Projects  Graphic organizers  Venn Diagrams  Anticipation/prediction guides  Daily “DO NOW”, “EXIT TICKET” (Constructive Response Journals Books) | | |
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|  | **Unit 3: Number/Algebra**  ***Domain (s): The Real Number System***  **NC.M2.N-RN**  **Extended the properties of exponents to rational exponents**  **Standards:**  NC.M2.N-RN.1 Explain how expressions with rational exponents can be rewritten as radical expressions.  NC.M2.N-RN.2 Rewrite expressions with radicals and rational exponents into equivalent expressions using the properties of exponents.  **Standards**  **Use properties of rational and irrational numbers**  NC.M2.N-RN.3 Use the properties of rational and irrational numbers to explain why:   * the sum or product of two rational numbers is rational; * the sum of a rational number and an irrational number is irrational; * the product of a nonzero rational number and an irrational number is irrational   ***Domain (s): The Complex Number System***  ***Defining complex numbers***  **Standards**  NC.M2.N-CN.1 Know there is a complex number *i* such that *i*2= – 1, and every complex number has the form *a + bi* where *a* and *b* are real numbers.  ***Domain (s): Reasoning with equations and inequalities***  ***Understanding solving equations as a process of reasoning and explain the reasoning***  **Standards**  NC.M2.A-REI.1 Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning.  NC.M2.A-REI.2 Solve and interpret one variable inverse variation and square root equations arising from a context, and explain how extraneous solutions may be produced.  **Standards**  Solve system and inequalities in one variable  NC.M2.A-REI.4 Solve for all solutions of quadratic equations in one variable.  a. Understand that the quadratic formula is the generalization of solving *ax2+bx+c* by using the process of completing the square.  b. Explain when quadratic equations will have non-real solutions and express complex solutions as *a ± bi* for real numbers *a* and *b*.  **Standards:**  Solve systems of equations  NC.M2.A-REI.7 Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.  **Standards:**  Represent and solve equations and inequalities graphically  NC.M2.A-REI.11 Extend the understanding that the *x*-coordinates of the points where the graphs of two square root and/or inverse variation equations y = and y = intersect are the solutions of the equation = and approximate solutions using graphing technology or successive approximations with a table of values. | |
| **Mathematics Practices:**  1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics.  5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Essential Question(s):**   * In what ways can the problem be solved and why should one method be chosen over another? * How does knowledge of real numbers help when working with complex numbers? * Why structure expressions in different ways? * How can the relationship between quantities best be represented? | |
| **Content Vocabulary:**   * **Expressions** * **Rational exponents** * **Irrational** * **Complex** * **Extraneous Solutions** * **Reasoning** * **Quadratic** * **Square root** * **Inverse variation** * **Inequalities** * **Quadratic formula** * **Completing the squares** * **System of linear equations** * **Complex solutions** | **Academic Vocabulary:**  **Justify**  **Explain**  **Construct**  **Represent**  **Argument**  **Create**  **Interpret**  **Build**  **Prove**  **Experiment**  **Reason** |
| **Concepts: ( I can……)**  **What Students Need to Know**:   * Recognize that a fractional exponent can be expressed as a radical or a root. * Extend the use of the power rule, from whole number exponents i.e., to rational exponents. * To rewrite expressions with rational expression into forms that are more simple or useful. * Understanding the properties of rational and irrational numbers. * Solve one variable inverse variations and square root equations that arise from a context. * To express solutions to a quadratic equation as a complex number. * The process of completing the square and to generalize it into the quadratic formula. * To explain why they choose a specific method to solve an equation. * Solve and interpret a system containing a linear equation and a quadratic equation in two-variables. * Find the point of intersection of the graphs and understand why. * Find the value of that makes . | **Skills:**  **What Students Need To Be Able To Do:**   * Students should be able to explain with mathematical reasoning how expressions with rational exponents can be rewritten as radical expressions. * Students should be able to use their understanding of rational exponents to solve problems. * Rewrite expressions with radicals and rational exponents using the properties of exponents * Justify the step in a solving process * Students should be able to explain their reasoning while simplifying expressions with rational exponents and radicals. * Students should be able to simplify expressions with radicals and with rational exponents. * Students should be able to rewrite expressions involving rational exponents as expressions involving radicals and simplify those expressions. * Students should be able to rewrite expressions involving radicals as expressions using rational exponents and use the properties of exponents to simplify the expressions. * Students should be able to explain the properties of rational and irrational numbers. * Students should be able to solve inverse variation equations. * Students should be able to rewrite expressions using what they know about complex numbers. * Students should be able to discuss the relationship between the quadratic formula and the process of completing the square. * Students should be able to identify the number and type of solution(s) of a quadratic equation * Students should be able to efficiently solve systems of equations with various methods. * Students should be able to solve complex equations and systems of equations |
| **Recommended Assessments:**  Daily Formative Assessments  Collaborative Assessments  Student Products  Common Formative Assessments (every 3 to 4 weeks)  Weekly Teacher made test  Quick writes  Find the error  Foldables  Discovery  Group work  Projects  Graphic organizers/ Constructions Steps  Venn Diagrams/ Two-column proof  Anticipation/prediction guides  Daily “DO NOW”, “EXIT TICKET” (Constructive Response Journals Books) | |
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|  | **Unit 4: Algebra**  ***Domain (s): Seeing structure in expressions***  **NC.M2.A-SSE**  **Interpret the structure of expressions**  NC.M2.A-SSE.1 Interpret expressions that represent a quantity in terms of its context.  a. Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.  b. Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.  NC.M2.A.ASSE.3 Write an equivalent form of a quadratic expression by completing the square, where *a* is an integer of a quadratic expression, *ax2 + bx + c*, to reveal the maximum or minimum value of the function the expression defines.  ***Domain (s): Perform arithmetic operations on polynomials***  ***Perform arithmetic operations on polynomials***  **Standards**  NC.M2.A-APR.1 Extend the understanding that operations with polynomials are comparable to operations with integers by adding, subtracting, and multiplying polynomials.  ***Domain (s): Creating equations***  ***Create equations that describe numbers or relationships***  **Standards**  NC.M2.A-CED.1 Create equations and inequalities in one variable that represent quadratic, square root, inverse variation, and right triangle trigonometric relationships and use them to solve problems.  NC.M2.A-CED.2 Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.  NC.M2.A-CED.3 Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context. | |
| **Mathematics Practices:**  1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics.  5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Essential Question(s):**   * How can the properties of the real number system be useful when working with polynomials and rational expressions? * Give an example of a real-world problem and write an expression to model the relationship, and explain how the algebraic symbols represent the words in the problem. * How are coefficients and factors related to each other? * How does viewing a complicated expression by its single parts help to interpret and solve problems? * What does it mean to call something a quantity? * What are the solutions to a quadratic equation and how do they relate to the graph? * What attributes of the graph will factoring and completing the square reveal about a quadratic function? * How is the system of polynomials similar to and different from the system of integers? * How do you translate real-world situations into mathematical equations and inequalities? * How do you determine if a situation is best represented by an equation, an inequality, a system of equations or a system of inequalities? * Why would you want to create an equation or inequality to represent a real-world problem? | |
| **Content Vocabulary:**  inverse variation  right triangle trigonometry  integer  monomial  binomial  trinomial  polynomial  factor  term | **Academic Vocabulary:**  **Justify**  **Explain**  **Construct**  **Represent**  **Argument**  **Create**  **Interpret**  **Build**  **Prove**  **Experiment** |
| **Concepts: ( I can……)**  **What Students Need to Know**:   * The parts of the expression relate to the context of the problem. * To write equivalent forms of an expression * Interpret any terms, factors, coefficients, radicands, and exponents * Model with quadratic, square root, inverse variation, or right triangle trigonometric expressions. * Complete the square to write a quadratic equation in vertex form: . * Determine that if there is a minimum and if there is a maximum. * Identify the maximum or minimum point from an equation in vertex form. * Understanding and fluency with polynomial arithmetic * Algebraic, tabular, and graphic methods of solving equations and inequalities. * To create systems of equations to model situations in contexts. | **Skills:**  **What Students Need To Be Able To Do:**   * Students should be able to identify and interpret parts of an expression in its context. * Students should be able to see parts of an expression as a single quantity that has a meaning based on context. * Students should be able to reveal the vertex of a quadratic expression using the process of completing the square. * Students should be able to rewrite polynomials into equivalent forms through addition, subtraction and multiplication * Students should be able to create one variable equations from multiple representations, including from functions. * Students should be able to create a equation from a context or representation and graph the equation. * Students should be able to recognize when a context requires a system of equations and create the equations of that system. |
| **Recommended Assessments:**  Daily Formative Assessments  Collaborative Assessments  Student Products  Common Formative Assessments (every 3 to 4 weeks)  Weekly Teacher made test  Quick writes  Find the error  Foldables  Discovery  Group work  Projects  Graphic organizers/ Constructions Steps  Venn Diagrams/ Two-column proof  Anticipation/prediction guides  Daily “DO NOW”, “EXIT TICKET” (Constructive Response Journals Books) | |
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|  | **Unit 5: Functions**  ***Domain (s): Interpreting functions***  **NC.M2.F-IF**  **Understanding the concept of a function and use function notation**  NC.M2.F.IF.1 Extend the concept of a function to include geometric transformations in the plane by recognizing that:  • the domain and range of a transformation function f are sets of points in the plane;  • the image of a transformation is a function of its pre-image.  NC.M2.F-IF.2 Extend the use of function notation to express the image of a geometric figure in the plane resulting from a translation, rotation by multiples of 90 degrees about the origin, reflection across an axis, or dilation as a function of its pre-image.  **Interpret functions that arise in applications in terms of a context**  **Standards**  NC.M2.F-IF.4 Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: domain and range, rate of change, symmetries, and end behavior.  **Analyze functions using different representations**  **Standards**  NC.M2.F-IF.7 Analyze quadratic, square root, and inverse variation functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.  NC.M2.F-IF.8 Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.  NC.M2.F-IF.9 Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).  ***Domain (s): Building functions***  ***Build a function that models a relationship between two quantities***  **Standards**  NC.M2.F.BF.1 Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).  ***Build new functions from existing functions***  **Standards**  NC.M2.F.BF.3 Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function *f* with *k ∙ ) + k, f (x + k)* for specific values of k (both positive and negative). | |
| **Mathematics Practices:**  1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics.  5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Essential Question(s):**   * How is a graph related to its algebraic function? * How could you use function notation to represent a specific output of a function? * How can you compare properties of two functions if they are represented in different ways? * How can you determine which form of a function is best for a given situation? * Why might you need to complete the square? * What data would you need to write a linear, basic quadratic, or basic exponential function? * How do you translate a description of the relationship between two quantities into an algebraic equation or inequality? * What are the transformations that can be done to a graph and how can they be represented algebraically? * How do you determine if two functions are inverses of one another? * Given a function, how do you find its inverse? | |
| **Content Vocabulary:**  Dilation  Reflection  Rotation  Coordinate Translation  Transformations  Function notation  Geometric transformation  domain and range  intercepts  intervals  increasing  decreasing  positive or negative  rate of change  maximums  minimums  inverse variation | **Academic Vocabulary:**  Justify  Explain  Construct  Represent  Argument  Create  Interpret  Build  Prove  Experiment |
| **Concepts: ( I can……)**  **What Students Need to Know**:   * Coordinate transformations are functions that have a domain and range that are points on the coordinate plane. * To express a geometric transformation when performing the following operations: Translation, Rotation counterclockwise or clockwise, Rotation ,Rotation clockwise or counterclockwise, Reflection over the x-axis , Reflection over the y-axis, Dilation * Explain the meaning of the key features in the context of the problem. * To describe the rate at which the function is increasing or decreasing * To represent a function with an equation, table, graph, and verbal/written description. * Compare characteristics of two functions. * To write an equation of a function that describes a quadratic or inverse variation relationship. | **Skills:**  **What Students Need To Be Able To Do:**   * Students should be able to view and entire ordered pair as the domain and another ordered pair as the range. * Students should be able to identify the type of transformation through the function notation. * Students should be able to use function notation to describe a geometric transformation. * Students should be able to interpret key features of a function from a verbal description. * Students should be able to interpret key features of a function from a table. * Students should be able to find the appropriate key feature to solve problems by analyzing the given function. * Students should be able use the process of completing the square to identify key features of the function. * Students should be able to identify the key features able to be found in each form of a quadratic function. * Students should be able to compare key features of two functions in different representations. * Students should be able to build functions that model a given situation using the context and information available from various representations. * Students should be able to describe the effect of transformations on algebraic functions. |
| **Recommended Assessments:**  Daily Formative Assessments  Collaborative Assessments  Student Products  Common Formative Assessments (every 3 to 4 weeks)  Weekly Teacher made test  Quick writes  Find the error  Foldables  Discovery  Group work  Projects  Graphic organizers/ Constructions Steps  Venn Diagrams/ Two-column proof  Anticipation/prediction guides  Daily “DO NOW”, “EXIT TICKET” (Constructive Response Journals Books) | |
| **Recommended Resources:**  **DPI website:** [**www.ncpublicschools.org**](http://www.ncpublicschools.org)  Algebra Resources  NCDPI Indicators  Instructional Resources  Common Core Unpacking the standards  Live Binder [www.livebinder.com](http://www.livebinder.com)  Google docs  Dropbox [www.dropbox.com](http://www.dropbox.com)  **Begin to include applications for each topic and open-ended questions**  [**http://www.doe.virginia.gov/instruction/mathematics/high/index.shtml**](http://www.doe.virginia.gov/instruction/mathematics/high/index.shtml)  [**http://www.smarterbalanced.org/smarter-balanced-assessments**](http://www.smarterbalanced.org/smarter-balanced-assessments) from given data?  <http://mdk12.org/share/frameworks/CCSC_AlgebraII.pdf>  <https://sites.google.com/a/audubonschools.org/mathematics/algebra-ii>  <http://www.state.nj.us/education/modelcurriculum/math/AlgebraIIu4.pdf>  <http://www.livebinders.com/play/play/430659?backurl=%2Fshelf%2Ffeatured&play_view=play>  <https://njctl.org/courses/> | |

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|  | **Unit 6: Applications of Probability**    **Domain: Conditional Probability and the Rules of Probability**  **NC.M2.S-CP**  **Understand independence and conditional probability and use them to interpret data.**  **Standards:**  NC.M2.S-CP.1 Describe events as subsets of the outcomes in a sample space using characteristics of the outcomes or as unions, intersections and complements of other events.  NC.M2.S-CP.3 Develop and understand independence and conditional probability.  a. Use a 2-way table to develop understanding of the conditional probability of A given B (written P(A|B)) as the likelihood that A will occur given that B has occurred. That is, P(A|B) is the fraction of event B’s outcomes that also belong to event A.  b. Understand that event A is independent from event B if the probability of event A does not change in response to the occurrence of event B. That is P(A|B)=P(A).  NC.M2.S-CP.4 Represent data on two categorical variables by constructing a two-way frequency table of data. Interpret the two-way table as a sample space to calculate conditional, joint and marginal probabilities. Use the table to decide if events are independent.  NC.M2.S-CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.  **Standards:**  **Use the rules of probability to compute probabilities of compound events in a uniform probability model**.  NC.M2.S.CP.6 Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in context.  NC.M2.S.CP.7 Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in context.  NC.M2.S.CP.8 Apply the general Multiplication Rule P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in context. Include the case where A and B are independent: P(A and B) = P(A) P(B).  **Domain: Making inference and Justifying Conclusions**  **NC.M2.S-IC**  **Understand and evaluate random processes underlying statistical experiments.**  **Standards:**  NC.M2.S-IC.2 Use simulation to determine whether the experimental probability generated by sample data is consistent with the theoretical probability based on known information about the population. | |
|  | **Mathematical Practices**  1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics.  5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | **Essential Questions**   |  | | --- | | 1. What is the difference between experimental probability and theoretical probability? 2. What is a frequency table? 3. What does it mean for events to be random? 4. In what real-world context would it be possible to use probability concepts to analyze decisions and strategies? 5. In what real-world context would it be possible to use probability concepts to make fair decisions? | |
|  | **Content Vocabulary**  Probability Random Events Random Conditional Probability Expected Value Data  Frequency Tables Sample  Independent Probability Counting Methods  Multiplication Rule Events  Simulations Addition Rule  Permutations Combinations  Inferences Statistics  Compound Probability Union  Intersections Complement  Subsets of Sample space | **Academic Vocabulary:**  Compare Estimate Symbolically  Technology Calculate Experiment  Compose Represent Illustrate  Determine Application  Relate Interpret  Context Prove  Observe Identify  Construct Apply  Recognize Evaluate Outcomes  Distinguish  Model |
|  | **Concepts: ( I can……)**  **What Students Need to Know**:   1. I can understand and establish events as subsets of sample space based on the union, intersection, and/or complement of other events. 2. I can construct a two-way table for categorical data and use them to interpret the data. 3. I can find probabilities based off the data in the two way table of specified events occurring. 4. I can identify and use the rules of probability to compute probabilities of compound events in a uniform probability model. 5. I can calculate expected values and use them to solve problems. | **Skills:**  **What Students Need To Be Able To Do:**   1. Understand and establish events as subsets of sample space based on the union, intersection, and/or complement of other events. 2. Construct a two-way table for categorical data and use them to interpret the data. 3. Find probabilities based off the data in the two way table of specified events occurring. 4. Identify and use the rules of probability to compute probabilities of compound events in a uniform probability model. 5. Calculate expected values and use them to solve problems. |
|  | **Recommended Assessments:**  Daily Formative Assessments  Collaborative Assessments  Student Products  Common Formative Assessments (every 3 to 4 weeks)  Weekly Teacher made test  Quick writes  Find the error  Foldables  Groupwork  Projects  Graphic organizers  Venn Diagrams  Anticipation/prediction guides  Daily “DO NOW”, “EXIT TICKET” (Constructive Response Journals Books) | |
|  | **Recommended Resources:**   |  | | --- | |  |   **DPI website:** [**www.ncpublicschools.org**](http://www.ncpublicschools.org)  Algebra Resources  NCDPI Indicators  Instructional Resources  Common Core Unpacking the standards (Live binder)  Live Binder [www.livebinder.com](http://www.livebinder.com)  Google docs  Dropbox [www.dropbox.com](http://www.dropbox.com)  **Begin to include applications for each topic and open-ended questions**  [**http://www.doe.virginia.gov/instruction/mathematics/high/index.shtml**](http://www.doe.virginia.gov/instruction/mathematics/high/index.shtml)  [**http://www.smarterbalanced.org/smarter-balanced-assessments**](http://www.smarterbalanced.org/smarter-balanced-assessments)  <http://mdk12.org/share/frameworks/CCSC_AlgebraII.pdf>  <https://sites.google.com/a/audubonschools.org/mathematics/algebra-ii>  <http://www.state.nj.us/education/modelcurriculum/math/AlgebraIIu4.pdf>  <http://www.livebinders.com/play/play/430659?backurl=%2Fshelf%2Ffeatured&play_view=play>  <https://njctl.org/courses/> | |